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NIST Looks at Electronic Equipment for First Responders

Emergency responders are using an increasing amount of electronic equipment during routine operations. As new technologies become available, it is important that standards be issued to incorporate these advances, and that first responders be aware of the performance limitations of the equipment. In the report, "Thermal Environment for Electronic Equipment Used by First Responders" by M. K. Donnelly, W. D. Davis, J. R. Lawson and M. J. Selepak, NIST Technical Note 1471, current equipment standards for electronic equipment used by firefighters and other emergency personnel are reviewed. Based on the protective characteristics of firefighter turnout gear, a thermal classification method was developed to serve as the basis for developing thermal standards for electronic devices used by first responders.

Performance of PASS Device Thermal Sensors Examined in Series of Full-Scale Experiments.

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British 2004/2005 Fire Statistics Provide Valuable Information

A recent survey in England revealed that fires in the home often are not reported to the Fire and Rescue Service (FRS) usually because the fire was extinguished by someone in the home or there were no injuries. In order to gather more complete data on household fire incidents in the area, the Office of the Deputy Prime Minister (ODPM) conducted the Survey of English Housing (SEH) and the findings were recently released.

The Survey of English Housing collects an array of social and demographic information, thus providing the opportunity to identify groups within the population that are most at risk.

SEH 2004/05 data shows that some 300,000 households in England (1.5% of the total) experienced a fire within the past 12 months. The majority of the fires were not serious.

Approximately 80% of these fires were extinguished by someone in the home. Over 90% did not result in serious injuries. It is estimated that the FRS responded to only 22% of the domestic fires reported in the survey. Smoke detector data was also gathered and provided insight into the utilization of these detectors.

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NIST Looks at Electronic Equipment for First Responders, cont.

The Fire Equipment Evaluator (FEE) was developed to investigate the performance of electronic equipment using simulated fire conditions. It is described in the report. In addition, results of testing the Personal Alert Safety System (PASS) are presented, including recommendations for revised standards for PASS.

Personal Alert Safety System (PASS) devices are designed to signal for aid if a fire fighter becomes incapacitated.

Thermal exposure sensor technology has already been included in a number of PASS devices, but no standard exists for testing the performance of the thermal sensor. The report, "*Performance of Thermal Exposure Sensors in Personal Alert Safety System (PASS) Devices*" by Nelson Bryner, Daniel Madrzykowski, and David Stroup, NIST IR 7294 addresses this issue. The report describes the performance of thermal exposure sensors in a series of laboratory- and full-scale tests. After a series of tests, the limited set of temperature versus thermal sensor activation data indicated that sensors respond differently under static, flowing, and radiation intense conditions. Full-scale data demonstrated that current thermal sensing/PASS implementations may not provide a firefighter with sufficient warning of an acute thermal hazard. The limited series of experiments demonstrates the need to develop a standard testing protocol to ensure that all PASS devices provide adequate protection for firefighters.

To learn more about the project, sponsored by the U.S. Department of Homeland Security, contact Michelle Donnelly at michelle.donnelly@nist.gov for electonic equipment standards or nelson.bryner@nist.gov for information on PASS.

British 2004/2005 Fire Statistics Provide Valuable Information, cont.

British Survey Provides Statistics on House Fires.

While smoke detectors are found in 80% of English homes, 10% of the homes do not have any type of fire safety protection. The majority (75%) of the battery-operated smoke detectors use one-year batteries. Of the households with smoke detectors, 92% have one installed in the hallway or landing.

The results of this survey can be found in the report "*Fires in the Home: Findings from the 2004/05 Survey of English Housing*."

This report presents information on fire safety measures and an estimate of working residential smoke alarms in England and identifies those households least likely to own a working smoke alarm. It also identifies those households at highest risk of experiencing fire. More about the survey results, this report and other fire statistic publications may be downloaded from the ODPM website at http://www.communities.gov.uk/index.asp?id=1163311

Forest Fire and Grassland Danger Meters Available

Forest fires and grassland fires present different challenges to wildlife, humans, and nearby communities. Identifying the potential level of threat allows for better level of preparedness and allocation of resources. The Australian Bushfire Behaviour and Management Team at the Commonwealth Scientific and Industrial Research Organisation (CSIRO) has announced the availability of meters (software and appropriate hardware) to be used to determine the potential hazard level of different types of fires. They are: the McArthur Mk 5 Forest Fire Danger Meter, the Grassland Fire Danger Meter, the CSIRO Grassland Fire Spread Meter, the CSIRO Fire Spread Meter for Northern Australia, and the House Survival Meter.

The House Survival Meter (HSM), the most "universal" of the meters, was designed in 1987 after many houses were destroyed in Victoria during the 1983 Ash Wednesday fires, one of Australia's most well-known bushfire events. The HSM provides a guide to the probability of a house surviving a bushfire based on six factors.

The two factors that are the most significant are the fine fuel load around the exterior of the house and the slope to windward side of the house.

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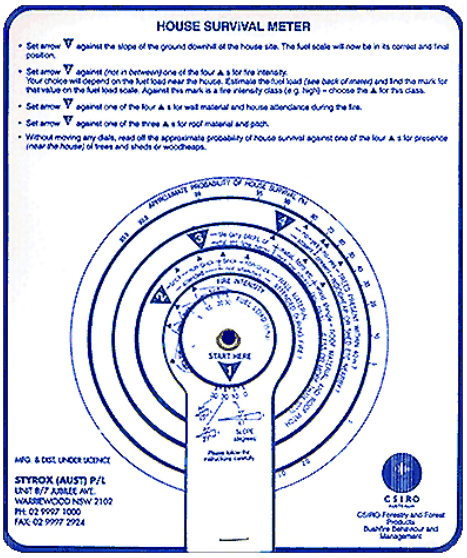
Forest Fire and Grassland Danger Meters Available, cont.

The remaining four factors that contribute to the potential survival of the house are the presence of people during the fire, type of wall cladding material, roof covering material, and combustible fuel near the house.

The meters are available as a Windows-compatible computer program. A free evaluation copy of the software is available at http://www.ffp.csiro.au/nfm/fbm/fire_mts.html.

From there, you may also obtain information on how to purchase the meters that CSIRO offers. For additional information, contact the Bushfire Behaviour and Management Team, at andrew.sullivan@csiro.au.

Additional information on testing of houses in the urban wildland interface (UWI), is available in FIRE.GOV's Issue 6, Summer 2002 in the article entitled "*UWI Landscaping Assisted by Fire Modeling*".



House Survivability Meter: a guide to the probability of a house surviving a bushfire.

Inside a Real House Fire

InterFIRE.org is a complete on-line resource center for fire services, fire insurers, law enforcement and others whose duties involve arson investigation, fire investigation safety and fire scene training. On their website, *interFIRE.org* is offering a new training module, "Inside the interFIRE VR Burn," that allows the viewer to virtually experience a house fire. In cooperation with the National Institute of Standards and Technology (NIST), four rooms of a home were used to create an interactive training video. The rooms were furnished with typical furniture and instrumented to obtain temperature and heat flux data. Thermally protected cameras, coolcams, were used to document the progress of the fire. The coolcams were mounted inside water-cooled steel cases, with high temperature windows. This protection enables the cameras to survive a flashover environment. Coolcam 1 was positioned on the floor of the dining room, and also provided a veiw of the living room. Coolcam 2 was located in the living room. One disposible camera was placed below the window sill on the north wall of the living room Additional cameras were also positioned outside the structure.

Once the training is started, the fire development can be viewed from four different camera positions. At any time during this process the temperatures and heat flux data can be graphed to gain a better understanding of the progress of the fire. After 5:08 minutes, when no flames were observed on the display screen, the firefighters extinguish the fire. The time from ignition until the firefighters extinguished most of the fire was 7:05 minutes. (Several smaller hot spots were located by firefighters and subsequently extinguished.) Additional details about the experiment are included in the NIST Report of Test, FR 4009, *"Full-Scale House Fire Experiment for interFIRE VR, May 1998."*

This exciting training exercise is one of several available from interFIRE's web site http://www.interfire.org. Examples of other exercises on the site are: Preparing for Trial, Accelerant Detection Canine Units, and First Response from an Investigative Perspective.

InterFIRE is supported by the U. S. Bureau of Alcohol, Tobacco, Firearms and Explosives, the American Re-Insurance Company, the National Fire Protection Association, and the U. S. Fire Administration. (See FIRE.GOV, Issue No. 10, Spring 2004, to learn more about interFIRE and some of their on-going activities.)

InterFIRE VR house fire provides views from three interior cameras and one exterior camera.

U.S. Economic Analysis of Residential Sprinkler Systems

While there is growing recognition of the enhanced ability of residential sprinkler systems to protect life and property from fires, very few existing one- and two-family homes in the U.S. include a sprinkler system. One study based on 15 years of data from Scottsdale, Arizona categorized fire damage in two types of homes—those with fire sprinkler systems and those without fire sprinkler systems. The study reported property loss due to a fire in a residential home with a sprinkler system was $ 2 166 compared to $ 45 019 in the homes without a sprinkler system.

What is the overall cost of residential sprinkler systems? A recent NIST report addresses the life-cycle cost of these systems. The report, "*Economic Analysis of Residential Fire Sprinkler Systems*" by Hayden Brown, NISTIR 7277, designs and applies a comparative life-cycle cost analysis to multipurpose network and stand-alone fire sprinkler systems designed in compliance with NFPA 13D. (This report is the first of two reports estimating the cost and benefits of fire sprinkler systems in residential single family housing.) The cost of each sprinkler alternative is estimated for a set of three NIST-designed prototypical houses (colonial, townhouse and ranch). The stand-alone design uses a dedicated water supply and piping in which water only flows when the sprinkler system is activated. The multipurpose network design connects to the regular domestic water supply and piping of the house, so water is continually circulated. The economic analysis followed the standard American Society for Testing Materials standard, ASTM E917-02, and included those elements of life-cycle cost that are unique to each system, for example, design, material, installation and inspection costs. System plans, a comprehensive list of required components, and materials costs were obtained from manufacturers and sprinkler system installers. Data on multipurpose network design and three stand-alone designs were obtained, in addition to material cost data, as well as the economic analysis.

The comparative analysis is applied to the cost data to determine which proposed system has the lowest estimated life-cycle cost. The estimated costs are with a close range, and are most sensitive to the decision to include a backflow preventer. The information in this report is in support of a follow-on benefit-cost study by NIST of residential sprinkler systems.

A copy of the report is also available on CD. For more information, contact Hayden Brown at hayden.brown@nist.gov.

Comparative Life-Cycle Cost Analysis Conducted for Residential Sprinkler Systems.

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